

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-3 and 7-17 are presently active; Claims 4-6 were previously cancelled without prejudice or disclaimer, Claims 1, 7, 13 and 14 have been presently amended. No new matter has been added.

In the Office Action, Claims 5 and 6 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claims 1-3, 5-12 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama et al (U.S. Patent No. 5,651,827) in view of Shamouilian et al (U.S. Patent No. 6,440,221) and Nath (U.S. Patent No. 4,149,086), Claim 13 was rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama et al in view of Shamouilian et al and Nath as applied to Claims 1-3, 5-12, and 14 and further in view of Hillman (U.S. Patent No. 5,997,649). Further, the reply filed on December 11, 2008 was considered by the Examiner to be not fully responsive to the prior Office Action because amended Claims 1, 7, 13 and 14 recited that the processing vessel is made of metal, but the language made is indefinite and has caused the claims to be unclear and thus unsearchable on the merits.

Claim Summary: Claims 1, 7, 13 and 14 as presently clarified defines:

A substrate processing apparatus, comprising:
a ***metal walled processing vessel*** that defines a processing space;
an ultraviolet light source that irradiates ultraviolet light into the processing vessel;
a gas injection nozzle unit that is connected to a side of the processing vessel and is configured to inject gas into the metal walled processing vessel;
an opaque case made of quartz that covers an inner wall of the processing vessel and includes an opening arranged to face against the ultraviolet light source through which opening the ultraviolet light passes;
a remote plasma part that is connected to the side of the processing vessel at which the gas injection nozzle unit is arranged and is configured to supply radicals to the processing vessel ***through a supply line***;

a heater portion that heats a substrate introduced inside the opaque case to a predetermined temperature;
a holding member that holds the substrate above the heater portion;
and
rotational drive means for rotating an axis of the holding member that penetrates through the heater portion. [Emphasis added.]

Regarding amended Claim 1, support for the phrase "*metal walled processing vessel*" added to Claim 1 is found on page 65, line 23, in the specification and support for the phrase "through a supply line" added to Claim 1 is found on page 31, lines 22-28, in the specification. Thus, no new matter has been added.

Regarding the 35 U.S.C. 112, second paragraph, rejection to Claims 5 and 6, these claims have been replaced with Claims 16 and 17. Further, the subject matter of original Claim 4 has been included in Claim 15 to provide an antecedent basis for "the transparent case." Thus, the 35 U.S.C. 112, second paragraph, rejection has been overcome.

The art deficiencies:

The asserted combination of Aoyama, Shamouilian and Nath does not disclose or suggests all of the elements of independent Claim 1, for at least the following reasons.

None of Aoyama, Shamouilian and Nath individually or in combination discloses, as recited in Claim 1, (1) an "opaque case made of quartz that covers an inner wall of the processing vessel" (hereinafter the opaque case feature), and (2) a "remote plasma part configured to supply radicals to the processing vessel through a supply line" (hereinafter the remote plasma part feature).

The opaque case feature: Regarding the opaque case feature, the originally filed specification describes by way of illustration on page 65, lines 20-26, that opaque case 102,

104, 106, 108 can be arranged in order to protect the processing vessel 22 made of aluminum alloy from gas and ultraviolet light as well as to prevent metal contamination of the processing space 84 by the processing vessel 22. Applicant's substrate processing apparatus can thus utilize an opaque case that covers an inner wall of the processing vessel in order to protect the processing vessel from ultraviolet light. The specification illustrates this effect with regard to ultraviolet light (which the opaque case protects against) having a wavelength of 172 nm. See specification on page 23, lines 5-6. Ultraviolet light of this type is generally called UVC (with a wavelength below 280 nm). Other ultraviolet light sources are known. Nath describes the use of UVA with a wavelength of 315 to 400 nm. UVC oxidizes metal to a greater degree than UVA.

Thus, the substrate processing apparatus of Claim 1 which includes an opaque case can protect the claimed metal walled processing vessel (e.g., a processing vessel made of an aluminum alloy) from gas and ultraviolet light (e.g., UVA or UVC) as well as to prevent metal contamination of the processing space by the processing vessel.

The Office Action asserted on page 3 that Aoyama teaches "an opaque case (liner)." The Office Action cites the Abstract and col. 3, lines 35-64. However, Aoyama merely describes a translucent or opaque reactor vessel 1, and an external heater 30 or an internal heater 30a. Figure 9 of Aoyama is reproduced below.

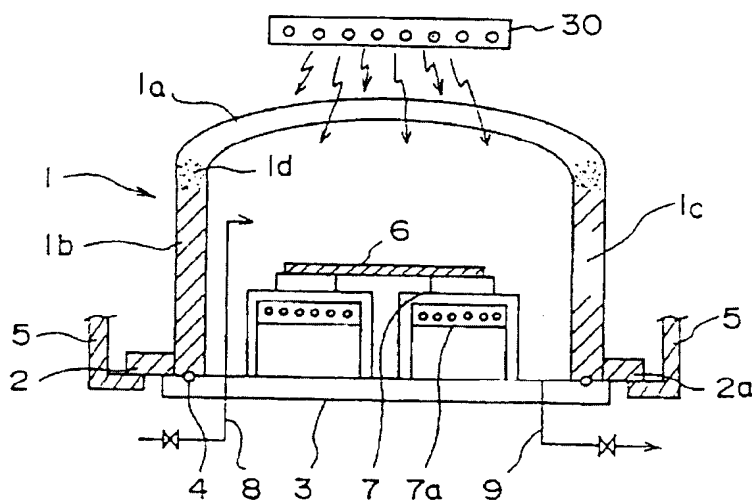


Fig. 9

Thus, Aoyama fails to disclose or suggest an opaque case made of quartz *that covers an inner wall of a metal walled processing vessel*, as defined in Claim 1. Indeed, element 1 in Aoyama is the inner wall of the processing vessel.

The Office Action applied Shamouilian for an asserted teaching of a PECVD chamber with a gas supply provided at all four walls. See page 3 of the Office Action. Shamouilian describes that the materials used to fabricate the process chamber 25 include metals, ceramics, glasses, polymers, etc. Yet, Shamouilian fails to disclose or suggest an opaque case made of quartz that covers an inner wall of the processing vessel, as defined in Claim 1. Thus, the deficiencies in Aoyama regarding the opaque case feature are not overcome by Shamouilian.

The Office Action applied Nath for an asserted teaching of tungsten lamps as a source of UV. Nath is directed to a dentistry irradiation device. Nath fails to disclose or suggest an opaque case made of quartz that covers an inner wall of the processing vessel, as defined in Claim 1. Thus, the deficiencies in Aoyama regarding the opaque case feature are not overcome by Nath.

The remote plasma part feature: Regarding the remote plasma part feature, the Office Action asserted that Shamouilian teaches that a RF power source, electrode, and an antenna 125 act as plasma generators. The Office Action on page 2 asserted that col. 4, lines 35-67, taught “remote plasma parts.” Yet, lines 35-51 describe an electrostatic chucking device and lines 52-67 describe an inductively coupled plasma system. As seen in Figure 4 of Shamouilian, the plasma generated under the rf coils in the processing space would be directly over the substrate to be processed. In other words, Shamouilian describes that the plasma generators generate a plasma of the process gas within the process chamber 25.

Further, it is well known in the art that the term “remote plasma” means generating a plasma (radicals) in a remote place and supplying the plasma from the remote place to a processing vessel through a supply line. As evidence, this knowledge in the art, the examiner’s attention is directed to the article for the Journal of Vacuum Science and Technology (1993) filed with the last reply.

Accordingly, it has not been made clear where (in this complex reference) that Shamouilian describes a remote plasma part. 37 C.F.R. § 104 (c)(2) indicates that, when a reference is complex or shows or describes inventions other than that claimed by the applicant, the particular part relied on must be designated as nearly as practicable. Accordingly, the requirement under 37 C.F.R. § 104 (c)(2) has not been met, and can not be met with Shamouilian.

Thus, Shamouilian does not teach or suggest a remote plasma part that is connected to the side of the processing vessel, as recited in Claim 1.

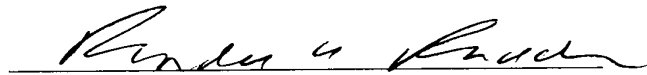
Conclusion: For at least the foregoing reasons, the asserted combination of Aoyama, Shamouilian and Nath does **not** disclose or suggests all of the elements of independent Claim 1, and withdrawal of the rejection from the application is respectfully requested.

Hence, when the defined features are considered as a whole, Claim 1 and the claims dependent therefrom are believed to patentably define over the art of record.

In view of the present amendment and in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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